

FIELD NOTES ON THE SPECIES OF *BRACHYSTEGLA* AND *ISOBERLINIA* OF TANGANYIKA TERRITORY.

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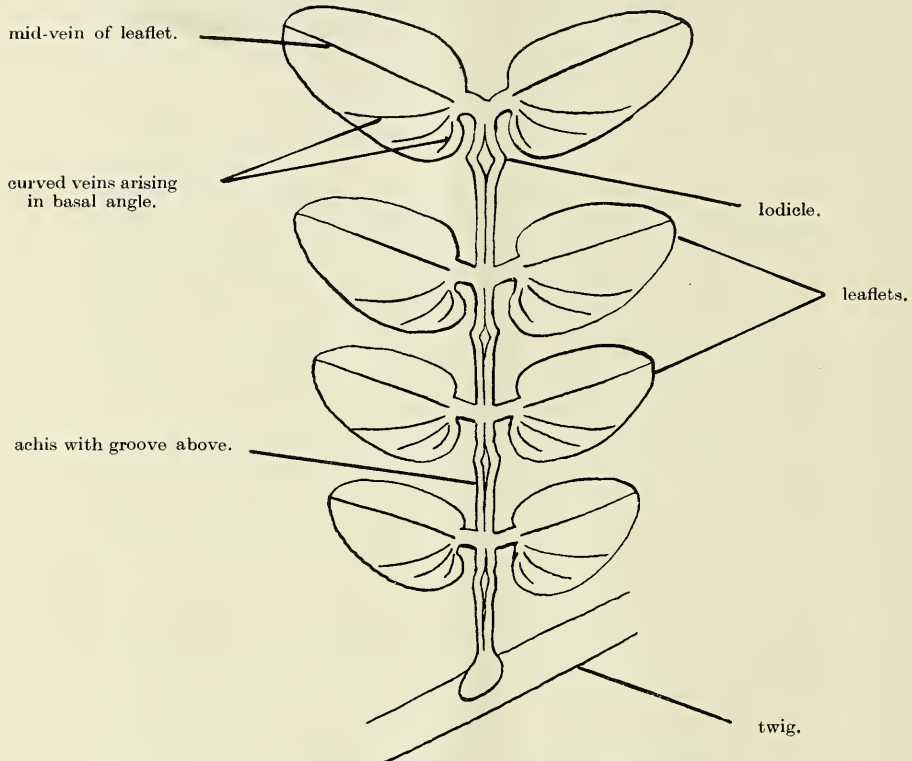
INTRODUCTION.—The tragic death of my friend B. D. Burt, Botanist of the Department of Tsetse Research, is the reason for the appearance of these notes under my name. He had been working on this group for some years in country with most of which I am familiar, and I feel it worth while to summarise field observations most of which have been frequently discussed between us. I am grateful to Messrs. A. C. Hoyle of Oxford, E. Milne-Redhead of Kew, and C. G. Trapnell of Northern Rhodesia, for their expert criticism of an early draft of this paper, which is intended for the field worker and not for the systematist.

The closely related genera *Brachystegia* and *Isoberlinia* (Caesalpiniaceae) dominate the dry woodland on eluvial soils to a height of about 6,000 ft. over a vast area of eastern Africa—a part of the Kenya coast, most of Tanganyika except the thornbush country in the north, the eastern part of the Belgian Congo, and much of the Rhodesias, Nyasaland, Portuguese East Africa and Angola.

The trees are of medium to large size and, growing gregariously, dominate the woodland where they occur. All but two of the species here considered may be recognised by the characteristic venation of the leaflets described in 3 (a) of the key. The same venation is found also in the allied *Cryptosepalum*; but of this genus two of the Tanganyika species are no more than dwarf shrubs a few inches high, and the third, with characteristic dumpy pods, is seldom more than a very small tree. Two species of *Isoberlinia* described lack the characteristic venation, but may be recognised by their enormous flat woody pods, sometimes a foot in length.

All the species have compound leaves borne alternately on the twigs, and divided into several pairs of leaflets. The leaflets are opposite to each other on the rachis or midrib of the leaf, and there is no single terminal leaflet. The rachis bearing the leaflets is sometimes grooved above; and this groove frequently opens out or thickens its margins just behind the insertions of the pairs of leaflets, to form the pointed or lumpy

excrecences known as lodicles.* Most of the *Brachystegias* show the groove and lodicles, but in *Isoberlinia* both are lacking, the rachis being rounded in section.



Diagrammatic drawing of a leaf of *Brachystegia*, showing the characteristic venation of the leaflets.

The pods are flat and woody, containing a few hard seeds. When shed they curl up, flattening out when wetted with the return of the rains.

Of the four species of *Isoberlinia* discussed, two may be distinguished by the fact that their trunks do *not* slash red, and the other two by their

*This word appears to have no botanical or etymological validity: but it has been used in this Department for many years and there seems to be no satisfactory substitute.

lacking the characteristic "*Brachystegia*" venation (3a of the key). All the *Brachystegias* have this venation and the bright red slash.

Over much of Tanganyika Territory the woodland dominated by these genera is collectively called "miombo" by the natives, and this convenient name has therefore been adopted by my Department. In some areas, however, the name refers to particular species, which vary from place to place.

NOTE ON THE USE OF THE KEY.—In the key and descriptions which follow I have rejected floral characters in most instances, as being unlikely to be useful to the field investigator who may seldom find flowering specimens.

Throughout the key the word "generally" should be understood. For example, if an occasional leaf has 6 pairs of leaflets but most have 3, 4 or 5, then the species will appear under "leaflets not more than 5 pairs." Adequate and well-grown material should always be used for specific diagnosis, and coppice shoots and terminal leaves must be avoided.

Finally, a determination made with the aid of the key must invariably be checked against the longer descriptions of the species, which are given for that purpose.

NOTE ON SYNONYMY.—The names of most species are now fairly well established, but there is still room for discussion on the status of the beautiful "mountain acacia," referred to by my Department as *Brachystegia microphylla* Harms, the name retained by me in the present paper. Of the relatives of this tree, the first to be described was *B. tamarindoides* Welw. from Angola. The second, *B. Fischeri* Taub., recorded from Tanganyika, may be a distant variety of *B. tamarindoides*, though it has a simple inflorescence which the latter has not. Further, *B. microphylla* may be a variety of *B. Fischeri* if this is in fact a good species; or *B. Fischeri* may be a hybrid of *B. microphylla* with *B. spicaeformis* Benth. or with *B. longifolia* Benth. Thus *B. microphylla* may become ultimately *B. Fischeri* or (less probably) *B. tamarindoides*, both earlier names.

I have preferred the earlier spelling (*spicaeformis*) to the simplified version (*spiciformis*) now in favour.

Finally, I would add that in previous publications on tsetse habitats I have made use of the following names which now require amendment:—

For *B. Boehmii* Taub., *B. flagristipulata* Taub.

For *B. longifolia* Benth., *B. glaberrima* R. E. Fries.

For *B. spicaeformis* Benth., *B. itoliensis* Taub. (hairy forms), and

B. edulis Hutch. & Burt Davy and *B. euryphylla* Harms (glabrous forms).

For *Isoberlinia globiflora* Harms, *Berlinia globiflora*.

KEY TO THE TANGANYIKAN SPECIES OF BRACHYSTEGLIA AND ISOBERLINIA.

1. *a.* Bark cuts yellow 2
b. Bark cuts red or pink 3
2. *a.* Bark not flaking *I. globiflora* Harms.
b. Bark flaking to expose yellow layer *I. paniculata* Benth.
3. *a.* Leaflets with a single nearly straight vein (mid-vein) either in middle or towards front margin, and 2 or more curved veins arising in basal angle behind straight vein 5
b. Leaflets without curved veins in the basal angle, and with normal venation 4
4. *a.* Old leaflets hairy below *I. tomentosa* (Harms) Hutch.
b. Old leaflets glabrous or nearly so below *I. densiflora* Bak. f.
5. *a.* Rachis not grooved above* ; leaflets not more than 5 pairs 6
b. Rachis grooved above ; or, if groove indistinguishable, leaflets more than 5 pairs 7
6. *a.* Leaflets tapering to a usually pointed tip *B. floribunda* Benth.
b. Leaflets broadly rounded *B. Burtii* Hoyle (Mss.).
7. *a.* Leaflets never more than 5 pairs 8
b. Leaflets more than 5 pairs 10
8. *a.* Bark quite smooth, light grey, flaking to expose yellow or orange layer *B. Bussei* Harms.
b. Bark more or less rough, not flaking 9
9. *a.* Mature leaves bluish or grey green *B. Allenii* Benth.
b. Mature leaves fresh to dark green *B. spicaeformis* Benth.
10. *a.* Leaf completely glabrous *B. longifolia* Benth.
b. Leaf hairy at least on underside of rachis 11.
11. *a.* Leaflets quite symmetrical about their mid-veins, never subtriangular 12
b. Leaflets more or less asymmetrical about their mid-veins, sometimes subtriangular 14
12. *a.* Bark smooth, flaking ; leaflets generally minute and numerous *B. microphylla* Harms.
b. Bark rough, not flaking ; leaflets never more than 12 pairs, never very small 13
13. *a.* Stipules with large, leafy basal auricle persistent at base of leaves *B. stipulata* de Willd.
b. Stipules not persistent in mature leaves *B. utilis* Hutch. & Burt Davy.
14. *a.* Leaflets very asymmetrical ; area behind the mid-vein at least three times that in front of it 15
b. Leaflets less markedly asymmetrical ; area behind the mid-vein less than twice that in front of it 16

* This groove is best seen close behind the insertion of the leaflets.

15. a. Front edge of leaflets usually convex, very rarely concave; leaflets never minute *B. wangermeeana* de Willd.
 b. Front edge of leaflets markedly concave; leaflets generally minute, yew-like *B. taxifolia* Harms.
16. a. Distance between insertions of leaflets usually less than greatest width of adjacent leaflets; subsidiary network of veins inconspicuous above. . . . *B. Boehmii* Taub.
 b. Distance between insertions of leaflets more than their greatest width; subsidiary network of veins conspicuous above *B. longifolia* Benth.

DESCRIPTIONS OF THE SPECIES.

Brachystegia. Trunks of all species slash deep red.

B. Allenii Hutch. & Burt Davy.

Leaflets 3—5 pairs, usually 4. Rachis grooved above, and lodicles present but inconspicuous. Each leaflet set in its own plane on the rachis. When the leaf is pressed, the leaflets often turn upside-down on the rachis, so that the anterior edges lie posteriorly and the upper surfaces outwards. Largest leaflets about the middle. Leaflets subrectangular, symmetrical about their mid-veins, the front margin basally much recurved on to the mid-vein, leaving a small open nick. Flush bright red, changing to bluish or greyish green. Bark grey, rather rough. Medium tree with rounded crown.

Rocky hills near Lake Tanganyika.

B. Boehmii Taub.

Leaflets 14 to 24 pairs. Rachis grooved above, and lodicles present. Always with some hairs, though the leaflets may be almost or quite glabrous. Distance between insertions of leaflets usually more than the greatest width of the adjacent leaflets. Largest leaflets behind the middle. Leaflets narrow, sometimes subtriangular; not markedly asymmetrical, the area behind the mid-vein of the leaflet being less than double that in front of it, and the mid-vein extending to the tip. Subsidiary network of veins inconspicuous above. Fallen dead leaves dull reddish, *not* orange. Flush metallic copper or fresh green, changing to green or dark green. Fruits brownish. Bark light grey, with irregular shallow grooves. Large tree with flat top.

Widespread, but scarce or absent in the Central Province.

B. Burtii Hoyle Mss.

Leaflets usually 3—4 pairs. Rachis without groove or lodicles. Largest leaflets generally terminal. Leaflets symmetrical about the mid-vein, mostly very rounded. Flush wine-colour, changing to bluish or

greyish green. Fruits bluish. Bark dark grey, a little rough. Medium tree with rounded canopy.

Rocky hills in S.W. Tanganyika, from 3,000 to 5,000 ft.

B. Bussei Harms.

Leaflets 2—4 pairs. Rachis grooved above and lodicles present. Largest leaflets terminal. Mid-vein of leaflet usually with a slight forward curve; leaflet symmetrical about the mid-vein. Flush bright red, changing to bluish or greyish green. Fruits greyish. Bark quite smooth, flaking to expose orange or yellow layer. Large tree with rounded canopy.

Rocky hills. Widely distributed in western Tanganyika.

B. floribunda Benth.

Leaflets 2—4 pairs, usually 3. Rachis very slender, laterally compressed, with "weeping" habit. The slender rachis permits an "aspen-like" trembling or fluttering of the leaves. No groove or lodicles on the rachis. Largest leaflets terminal. Leaflets usually somewhat pointed, the mid-veins with a slight forward curve. Leaflet symmetrical about the mid-vein. Flush bright red, changing through mauve to bluish or greyish green. Flowers inconspicuous, dense panicles, mainly on the older wood. Fruits bluish. Bark grey, fairly smooth. Medium tree with rounded canopy.

High altitudes, usually above 5,000 ft., in S.W. Tanganyika.

B. longifolia Benth.

Leaflets 5—13 pairs, usually about 9. Rachis with groove and lodicles. Some races have completely glabrous rachis and leaflets, others are hairy. Distance between insertions of leaflets more than the greatest width of adjacent leaflets. (Specimens from the central and southern plateaux have the leaflets less markedly separated and very hairy, and are, therefore, liable to be confused with *B. Boehmii* Taub. Northward and westward the separation of the two species presents no difficulty, for hairy specimens of *B. longifolia* do not occur.) Largest leaflets about or behind the middle. Leaflets rather narrow, more or less asymmetrical about the mid-vein and often subtriangular. Subsidiary network of veins conspicuous above. Flush very bright red, changing to green or dark bluish green. Underside of leaflets glaucous in colour. Fruits brownish. Bark dark grey, with well-separated, deep, vertical furrows on well-grown trees. Large tree, sometimes stunted at high altitudes, with more or less flattened crown.

Widely distributed in the western half of the country.

B. microphylla Harms.

Leaflets usually minute and very numerous; however, forms with fewer and larger leaflets do occur. Rachis with groove and lodicles, though these may be difficult to make out. Largest leaflets usually about the middle. Leaflets symmetrical about the mid-vein. Flush usually pinkish or yellowish, changing to green. Bark smooth, grey, flaking to expose a grey layer. Medium to large tree with flat top.

Rocky hills and ridges everywhere.

B. spicaeformis Benth.

Leaflets 3—5 pairs (very rarely 6). Rachis with groove and conspicuous lodicles. Largest leaflets terminal. Leaflets symmetrical about the mid-vein, of very variable shape, but never narrow. Flush very variable, green, wine-colour, or yellowish, occasionally bright red; changing to green. Leaflets always very shining. Fruits greyish. Bark iron-grey, rough where fire-scarred. Medium or large tree with rounded canopy.

Common everywhere except at very high altitudes.

B. stipulata de Willd.

This tree is not familiar to me, and I have seen it only near Abercorn, in Northern Rhodesia. It appears to be distinguished from *B. utilis* Hutch. & Burt Davy (*q.v.*) only by the persistence of the stipules, with the large leafy auricles, at the leaf bases; and by its very large flowers, of which the buds are half an inch or more in length.

Ufipa district of the Western Province.

B. taxifolia Harms.

Leaflets usually minute and very numerous, never very few. Rachis with inconspicuous groove and lodicles. Largest leaflets about middle. Leaflets markedly asymmetrical, the mid-vein lying close to the front edge, which is concave. Flush reddish or yellowish changing to shining dark green, the adult leaf being yew-like. Fruits short, bluish. Bark dark grey and rough. Medium tree with very flat top, occasionally a thicket-forming coppice.

Extreme S.W. Tanganyika.

B. utilis Hutch. & Burt Davy.

Leaflets 5—11 pairs, usually 6—9. Rachis with groove and lodicles. Largest leaflets about middle. Shape of leaflets very variable, but always rounded at end; may be wide or narrow; always symmetrical about mid-vein. Flush red or yellow, changing to green. Fruits brownish. Bark dark grey, rough. Medium tree with rounded canopy.

Rocky hills. Widely distributed.

B. wangermeeana de Willd.

Leaflets 14—28 pairs, usually 15—20. Rachis with groove and lodicles, always with some hairs even when leaflets have not. Distance between insertions of leaflets less than their greatest width. Largest leaflets behind middle. Leaflets markedly asymmetrical, somewhat subtriangular, the area behind the mid-vein being at least three times that in front of it, and the mid-vein ending somewhat short of the tip. Front edge of leaflets usually convex, very rarely concave. Flush green with pink tips, changing to rather bluish green. Fallen dead leaves orange. Fruits brownish. Bark dark grey, rough. Medium to large tree, with rounded crown.

Widely distributed, but not very common, in western Tanganyika.

Isoberlinia. Trunk slashes yellowish or pink, never deep red.*I. globiflora* Harms.

Leaflets about 4 pairs, with "Brachystegia" venation. Flesh greenish or yellowish, turning to green. Flowers end of rains, as distinct from *Brachystegia* spp. and *Isoberlinia densiflora*. Bark grey, rough where fire-scarred, not flaking. Slash yellowish. Medium to large tree with rounded crown.

Common everywhere to 5,000 ft.

I. paniculata Benth.

Leaflets about 4 pairs, with "Brachystegia" venation. Flush shining yellow, recalling a yellow oilskin, changing to green. Flowers end of rains. Bark smooth, light grey, flaking to expose a yellow layer. Slash yellowish. Large tree with rounded crown.

Common over 4,000 ft. in extreme S.W. Tanganyika.

I. densiflora Bak. f.

Leaflets large, generally over 4 inches long, with normal venation, glabrous or nearly so below when adult. Flush pinkish through mauve to green. Flowers end of dry season. Fruit a very large flat pod, up to a foot long. Bark grey, slightly rough. Slash pink.

Common over 4,000 ft. in western Tanganyika.

I. tomentosa (Harms) Hutch.

Leaflets as above, but always hairy below. Flowers end of rains. Fruit and bark as above.

Locally frequent in western Tanganyika.